Fall 2004

CS 766: Evolutionary Computation

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F04

CS 766 Evolutionary Computation

This course explores evolutionary computation from a historical, theoretical, and application viewpoint. An overview of the most common evolutionary search techniques are presented including genetic algorithms, evolutionary programming, evolutionary strategies, and genetic programming. The fundamental issues driving the choice of problem representation and specific genetic operators are discussed. Various applications of evolutionary computation to problems in control, optimization, and pattern recognition are examined.

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Office Hours: Monday 4:30-5:30, Wednesday 1:30-3:30, and by appointment

Required Textbook: Evolutionary Computation 1: Basic Algorithms and Operators,
Edited by T. Back, D. Fogel, T. Michalewicz, Institute of Physics Publishing, 2000.

Recommended: Evolutionary Computation 2: Advanced Algorithms and Operators,
Edited by T. Back, D. Fogel, T. Michalewicz, Institute of Physics Publishing, 2000.

Workload:

2 -3 Homework Exercises	25%
1 Midterm Examination	25%
1 Final Examination	25%
1 Course Project	25%

Grading: 90-100 A, 80-89 B, 70-79 C, 60-69 D, < 60 F

Week	Course Topics	Reading
1	What is evolutionary computation, its applications, and its strengths?	pp 1 - 22
2	Biological information processing and its relationship to evolution.	pp 23 - 51
3-4	Forms of evolutionary algorithms: genetic algorithms and evolutionary strategies, evolutionary programming, genetic programming, and classifier systems	pp 59 - 126
5	Representation: defining a search space and representing potential soultions.	pp 127 -164
6-7	Selection: survivial of the fittest?	pp 166 - 234
8	Evolutionary Operators: mutation	pp 235 - 256
9	Evolutionary Operators: recombination	pp 257 - 329
10	Fitness Evaluation	